

Seat No.: \_\_\_\_\_

Enrolment No. \_\_\_\_\_

## GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-VII EXAMINATION – SUMMER 2016

**Subject Code:171002**

**Date:07/05/2016**

**Subject Name:Power Electronics**

**Time:02:30 PM to 05:00 PM**

**Total Marks: 70**

**Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1 (a)** Answer the following in brief **08**
- (i) What is commutation in SCR circuits? Explain self commutation in SCR circuits.
- (ii) Compare SCR and TRIAC
- (b)** Answer the following **06**
- (i) List the various turn on methods of SCR. Explain resistance triggered circuits.
- (ii) Explain how fly wheel diode improves the power factor of the systems.
- Q.2 (a)** Explain the operation of single phase fully controlled bridge converter with inductive load. Draw the associated waveforms. **07**
- (b)** What are the needs of series and parallel operations of thyristor? Explain the problems with series and parallel operations of thyristor and possible solutions **07**
- OR**
- (b)** Define the following terms for SCR **07**
- (i) Latching and holding current (ii)  $dv/dt$  and  $di/dt$  rating
- (iii) Thermal and current rating
- Q.3 (a)** Explain the principle of an inverter. With help of neat diagram and associated waveform explain the operation of single phase half bridge voltage source inverter. **07**
- (b)** Explain the principle of operation of step up Chopper with resistive load. Differentiate between constant frequency and variable frequency operation of this chopper. **07**
- OR**
- Q.3 (a)** Explain the circuit diagram and operation of three phase bridge inverter. Draw phase and line voltage waveforms on the assumption that each thyristor conducts for  $120^\circ$  and resistive load is star connected. **07**
- (b)** With the help of a neat circuit diagram and associated waveforms, discuss the operation of Buck converter. List the advantages and disadvantages of this type of converter. **07**
- Q.4 (a)** What is forced commutation? With help of circuit diagram and necessary waveform explain the complementary commutation. **07**
- (b)** Explain the construction and characteristics of GTO. Compare the turn on and turn off method of GTO with SCR. **07**

**OR**

- Q.4 (a)** Draw a circuit diagram for ramp and pedestal trigger circuit used for the single phase semi converter. Describe its operation with appropriate waveforms. **07**
- (b)** Write short note on IGBT. **07**
- Q.5 (a)** Explain the circuit diagram and working of single phase semi converter with freewheeling diode. **07**
- (b)** Write short note Uninterrupted Power Supply. **07**
- OR**
- Q.5 (a)** Write short note on four quadrant Type E chopper. **07**
- (b)** Write short notes on dielectric heating and induction heating **07**

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